Air Pollution in China, with Junfeng (Jim) Zhang

Ashley Ahearn

Air pollution in China, one of the world's oldest civilizations, reflects a combination of traditional and modern-day factors. Severe air pollution in Chinese cities is the result of rapid industrialization, urbanization, and growth in vehicle use. At the same time, traditional indoor burning of solid fuels such as coal and dung presents acute, severe exposures to pollutants including particulate matter, carbon monoxide, arsenic, and mercury. In this podcast, Junfeng (Jim) Zhang tells host Ashley Ahearn about some of the factors that make air pollution a significant problem in China.

AHEARN: It's The Researcher's Perspective. I'm Ashley Ahearn.

This year marks the 10th anniversary of EHP's Chinese-language edition. In honor of the occasion we're taking a look at air pollution and human health in that country.

In China an estimated 470,000 people died from exposure to outdoor air pollution in 2000,[i] and each year an estimated 400,000 premature deaths result from indoor air pollution—exposures like coal smoke from heating and cooking.[ii] With increasing fossil fuel consumption and urban populations on the rise in that country, scientists and citizens alike are calling for more stringent environmental standards to protect human health.

Dr. Jim Zhang is a professor of environmental and global health at the Keck School of Medicine at the University of Southern California. He joins me via Skype to talk about air pollution and human health in China.

Hi, Dr. Zhang.

ZHANG: Hi, Ashley.

AHEARN: Let's start from a global perspective. How does the air quality in China compare to other countries, and what makes up the air pollution in China?

ZHANG: Historically China now is at a developmental stage that two types of air pollution coexist. One is the traditional air pollution, which is the simple combustion in uncontrolled devices like cook stoves, and those devices are very polluting because they using poor-quality fuels like wood, crop residue, or coal. And [the other is] you have power plants. You have industrial facilities, oil refineries, and then very importantly you have motor vehicles using fossil fuels.

So China has the combination of those both very old traditional air quality problems plus the modern industrialization-associated air pollution. So if you look at the other developing countries like India, so the situations are similar, but if you compare to Western countries the air quality is much better than today's air quality in Chinese cities.

AHEARN: Dr. Zhang, you did some interesting research[iii] around the time of the Beijing Olympics in 2008 when the Chinese adopted some very stringent regulations to improve the air quality. Tell me about your findings.

ZHANG: Yes, we measured air quality two months before the Olympics and during the Olympics and two months after the Olympics, and at the same time we recruited a group of Beijing residents. And then we measured their cardiovascular and respiratory health end points, and we compared those health end points before the Chinese government started that very aggressive air pollution control actions for the Olympics. And what we found was really very interesting and pretty much supports our hypothesis, which is that during those six weeks of air quality improvement, cardiovascular and respiratory health conditions of those Beijing residents improved, and after the Games, when the air quality control regulations were relaxed, we saw the increase of the air pollution levels again, and same time we saw that those improved parameters of cardiovascular health and respiratory health also got worse again.

So it's very clear that when you've got an air quality improvement you've got a health improvement, and when that improvement of air quality is ended your health

improvement is also ended. So that's clearly meaning that we need sustained long-term policy control actions, but same time I think one of the legacies of the Beijing Olympics is that the public actually saw this improved air quality. You know, I have friends who live in Beijing. They're not environmental professionals but they saw how blue, how nice the skies were during that period, and they said they'd really like to have that kind of thing continue, because many people haven't seen that kind of air quality for years. Some kids who were born in China, if they're younger than 20 years, they've never seen air that was that better in their entire life.[iv]

AHEARN: Dr. Zhang, let's talk a little bit about environmental policy in China. You coauthored a commentary[v] where you critiqued the way the Chinese government has dealt with environmental issues, and you also said that some things are going right in terms of Chinese environmental policy. Let's talk about those.

ZHANG: Sure. First of all the environmental protection, I think, just got to the government's agenda very recently because for years the focus of the government is on the economic growth, and [air] quality has probably always been put at the bottom of their list. But that situation is gradually changing, I think largely driven by the public's awareness of environmental damage. And with a very rapid GDP increasing, China has ability to address some very urgent environmental quality issues.

In that commentary the two things that Chinese government has done worth mentioning and maybe actually set a good example: one is on the motor vehicle emissions of air pollutants. The national average of fuel efficiency as measured by miles per gallon—that number is way below the U.S. numbers. And also they have adopted the current European Union standards for emissions of carbon dioxide, NO_x, all those pollutants that come out of the tailpipe of the vehicles. So that's one thing I think China's environmental policy really did a good job on. That and [the] second thing was Chinese government really invested in non–fossil fuel energy—renewables and nuclear—way bigger than the U.S. invested in the same non–fossil fuel energy options.

AHEARN: From your perspective, where is Chinese environmental policy falling short?

ZHANG: I think one of the most important things is the regulations, the laws, and the other one is the implementation of those laws. And the Chinese MEP—Ministry of Environmental Protection—set up lots of regulations, but at the local government level sometimes you have those competing interests: the economic, industrial interest or the environmental interest. And so I think there is lots of room to improve in that area.

AHEARN: What needs to happen, from your perspective, to ensure good environmental health and environmental quality in the future?

ZHANG: I think it's really the education, and one thing I think that's promising is the NGOs, nongovernmental organizations. Probably a majority of those NGOs in China has an environmental focus, so I think they have been very instrumental in terms of engaging the local people who may see some industry want to come in to have a facility in the middle of their community. And there is, in the last couple of years, there's lots of media reports on those kinds of conflicts, and some caught national attention on some of those protests. And that means the public's awareness of how environmental quality can affect quality of life is just tremendous.

So when everybody realizes how important air quality is, then I think they will push through the government policymaking mechanism, and that's where I think we'll see the major improvements of air quality and other environmental situations in China.

AHEARN: Dr. Zhang, thanks so much for joining me.

ZHANG: My pleasure.

AHEARN: Dr. Jim Zhang is a professor of environmental and global health at the Keck School of Medicine at the University of Southern California.

And that's The Researcher's Perspective. I'm Ashley Ahearn. Thanks for downloading!

References and Notes

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[i] Saikawa E, et al. Present and potential future contributions of sulfate, black and organic carbon aerosols from China to global air quality, premature mortality and, radiative forcing. Atmos Environ 43(17):2814–2822 (2009); doi:10.1016/j.atmosenv.2009.02.017.

[ii] Zhang J, Smith KR. Household air pollution from coal and biomass fuels in china: measurements, health impacts, and interventions. Environ Health Perspect 115(6):848–855 (2007); doi:10.1289/ehp.9479.

[iii] Kipen H, et al. Measurement of inflammation and oxidative stress following drastic changes in air pollution during the Beijing Olympics: a panel study approach. Ann N Y Acad Sci 1203:160–167 (2010); doi:10.1111/j.1749-6632.2010.05638.x.

[iv] Economic reforms in China since 1978 have resulted in explosive industrialization often accompanied by unchecked pollution. Although Zhang says air quality during the 2008 Olympic Games was still worse than in typical U.S. cities, it nevertheless marked the first time many young Beijing residents had ever seen a bright blue sky, and it reminded older residents of a sight last seen decades earlier. Zhang says, "Many people told me, 'We now realize that the real sky can be this blue and beautiful.'"

[v] Remais JV, Zhang J. Environmental Lessons from China: Finding Promising Policies in Unlikely Places. Environ Health Perspect; doi:10.1289/ehp.1003024 [online 10 Mar 2011].

Ashley Ahearn, host of *The Researcher's Perspective*, has been a producer and reporter for National Public Radio and an Annenberg Fellow at the University of Southern California specializing in science journalism.